Assessment Activities

Current Projects

Publications in Press

Recent Publications

Selected Publications of Interest

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The Technology Assessment Board approves the release of this report. The views expressed in this report are not necessarily those of the Board, OTA Advisory Council, or of individual members thereof.

Preface

This booklet is designed to provide Members of Congress and their staffs with:

- brief summaries of our current work projects and the dates currently projected for their delivery of final draft reports to OTA's Congressional Board;
- notices of publications in press;
- announcements of recently published reports; and
- lists of selected publications of interest.

We hope that this information will increase OTA's effectiveness in aiding Congress.

Legislative deadlines often require OTA to release specific information from an assessment before completion of the full project. Frequently this information is conveyed through a staff briefing, testimony, or a technical memorandum.

We will update this booklet periodically and welcome your comments on its value. For additional copies of this booklet, please contact our Publishing Office (202-224-8996).

John H. Gibbons

JOHN H. GIBBONS
Director

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CURRENT PROJECTS

ENERGY, MATERIALS, AND INTERNATIONAL SECURITY

Industrial Energy Use

This project is designed to examine a series of four American industries (pulp and paper, steel, petroleum refining, and organic chemical production) for their potential to use energy more efficiently, and to predict the impact of selected legislative options on energy use and efficiency within those industries.

OTA will examine the available technologies designed to improve energy efficiency, as well as the barriers to such technology's implementation. The legislative options to be examined range from tax policy changes such as accelerated depreciation to institutional changes in capital financing methods. Each option's effects will be evaluated through a series of case studies in which corporation executives, consultants, and computer-modeling techniques are used to forecast the impacts of possible congressional action. Options will also be examined at the industry, industrial sector, and national energy use and economic levels using a similar series of modeling, management, and consultant evaluations.

Delivery date: Summer 1982. Call 226-2152 for further information.

Requesters: House Committee on Energy and Commerce, Senate Committee on Finance.

Synthetic Fuels for Transportation

Synthetic Fuels for Transportation is a project in the Energy Program to assess various synthetic fuels that can be used for transportation and automotive technology that can increase passenger car fuel efficiency beyond 1985 standards, and to compare these two options. The issue is how best to balance these approaches, as the synthetic fuel program develops and efficiency increases are contemplated, to achieve the most effective and economic path to reduced dependency on imported oil.

The Energy Program will review the technical, economic, environmental, and social features of the major synthetic fuels and automotive technology (increased automobile fuel efficiency and electric vehicles) including information from reports by the Congressional Research Service, the Congressional Budget Office and OTA studies on oil shale and biomass. In addition, potential oil savings through increased efficiency and fuel-switching in stationary uses of oil will be briefly described. Synthetic fuels and increased automobile fuel efficiency will then be compared using a variety of criteria,

including consumer and investment costs, time frame for deployment, environmental impacts, and macroeconomic impacts. Selected issues related to these subjects will be discussed and policy options developed.

Delivery date: Early 1982. Call 226-2152 for further information.

Requester: Senate Committee on Commerce, Science and Transportation

Industrial and Commercial Cogeneration

The need to reduce U.S. dependence on expensive and scarce petroleum as a primary fuel in the industrial, commercial, and electric utility sectors has created a resurgence of interest in cogeneration—the combined production of both electric power and heat or steam in one technological process. Because the total amount of fuel needed to produce both power and heat/steam in a cogenerator is less than the total fuel needed to produce the same amount of power and heat/steam in separate technologies (e.g., a powerplant and an industrial boiler), cogenerators can contribute to our Nation's efforts to use fuel more efficiently. Moreover, problems faced by the electric utility industry, including rapidly rising capital costs, long lead-times for powerplant construction, and difficulties in finding suitable sites, may make cogenerators an attractive alternative to conventional central station powerplants. This assessment will examine the role that cogenerators could play in providing electric and thermal energy for industrial and commercial facilities while distributing electricity to the utility grid. It will review the economic, environmental, social, and institutional consequences of cogeneration, with a special emphasis on the potential effects on the electric utility industry's planning and operations. Finally, the study will analyze policy options that Congress may wish to consider in addressing the issues about the development of cogeneration systems.

The assessment will examine the technical features of commercial and advanced cogeneration technologies, including requirements for connecting cogenerators to the utility grid and technologies for storing thermal or electrical energy. It will then evaluate the economic and technical effects of grid-connected cogeneration systems on electric utilities using a computer model that minimizes the costs of providing electric and thermal power. A major focus of this evaluation will be the potential effects of oil- and gas-fired cogenerators on overall oil/gas use. Finally, a series of issues on the incentives for cogeneration in the industrial and commercial sectors, and on the economic, environmental, and social effects of cogeneration will be examined.

Delivery date: Early 1982. Call 226-2152 for further information.

Requester: House Committees on Banking, Finance, and Urban Affairs; Energy and Commerce; Science and Technology.

Strategic Technologies for an Oil Disruption

Over the next decade, there is a high probability that the Nation will experience a disruption in imported oil of a level that will exceed the capabilities of the Strategic Petroleum Reserve and seriously affect the economy.

This assessment will examine the opportunities and problems that characterize various technical responses that could supplement the Strategic Petroleum Reserve to meet such an interruption. The objective will be to determine what available resources might be expanded, the technical limitations for fuel substitution and switching, the physical constraints of stockpiling resources, and the impacts of accelerating the use of these technologies. Technologies to be considered will include enhanced oil recovery; adapting industrial boilers to dual-fuel capacity; biomass production; high-voltage transmission; hydro; wind; direct solar; vehicle retrofits; photovoltaics; retrofitting building envelopes and heating/cooling systems; retrofitting vehicles to improve mileage efficiency; and switching capacity of petroleum refineries. The study will be done at national and regional levels.

The assessment will be completed in two phases. Phase I will draw on OTA staff resources to collect data on the technical capabilities and constraints of the intervention technologies, and develop a summary document on potential of the technologies to alleviate the effects of various levels of oil disruption. A workshop will be held to review the data, and a Technical Memorandum will be published. In Phase II, OTA will examine the most promising technologies in greater detail, including complicated questions such as refinery switching capacity, burner substitution logistics, electrical grid capacity and requirements.

Delivery date: Technical Memorandum, early 1982. Full Report, late 1982. Call 226-2102 for further information.

Requesters: Senate committees: Intergovernmental Affairs; Foreign Relations.

Potential U.S. Natural Gas Availability

In the past few years there has been a change in the outlook about the potential for natural gas production in the lower 48 States. Recent optimistic projections by some groups have stimulated efforts to revise current natural gas policy so that natural gas can play a bigger role in reducing this country's oil imports. There remains, however, considerable uncertainty about how much the United States can rely on natural gas, which is tempering this optimism. This assessment is designed to help determine domestic (lower 48 States) onshore natural gas availability over the next few decades, and to help understand the factors that affect this availability. The OTA assessment

will: 1) analyze the key technical and physical parameters that determine the resource base, production rates, and costs of all categories of below-ground natural gas; 2) critically review current estimates of the resource base; estimate the potential production rates of natural gas; and analyze the uncertainties in these estimates; 3) assess future technology trends, research and development needs that may accelerate these trends; and 4) analyze the institutional and policy issues appropriate for a Federal role in dealing with barriers to production.

Delivery date: [illegible] Call 226-2152 for further information.

Requester: [illegible]

Nonnuclear Industrial Hazardous Waste

Many nonnuclear industrial hazardous wastes must be stored or disposed of with great care or they may constitute a threat to health and the environment. Information on the nature and magnitude of the hazardous waste disposal and abandoned site problem will be reviewed. The reliability and efficacy of present containment, abatement, and disposal measures will be assessed. This information, coupled with criteria and techniques to judge relative health and environmental hazards of a given waste, will assist in identifying those wastes that could be reduced at the source—by modifications in process technologies, by recycle, or by an end-use substitution. Approaches for reducing hazardous waste generation with minimal undesirable economic effects on domestic industry will be identified.

This assessment has four objectives: 1) to assess criteria for defining hazardous waste and for judging the relative health and environmental hazards of a given waste; 2) to evaluate technologies for cleaning up present waste disposal sites that are hazardous to health and the environment; 3) to assess technologies and approaches for the safe storage or disposal of hazardous waste being presently generated; and 4) to assess technologies and approaches for reducing the volume of hazardous waste. The possible economic impacts on domestic industry of various approaches will be evaluated.

The project will focus initially on understanding the adverse consequences of present disposal strategies and techniques, and next on ways of reducing generation of industrial hazardous waste economically. Alternative options will be developed to cope with hazardous waste disposal in the short run and hazardous waste generation in the long run.

Delivery date: Technical Memorandum published November 1981 (see Recent Publications, p. 29); Full Report due summer 1982. Call 226-2269 for further information.

Requester: House Committee on Energy and Commerce

Wood: The Material, The Resource

The United States has 483 million acres of commercial forestland; 14 billion cubic feet of timber were harvested in 1976. However, the United States still imports nearly 30 percent of its softwood lumber, approximately half of the wood pulp, and significant quantities of plywood. The forest industry and Government experts state that with new technologies for improved forestry practices, better wood utilization, and new product development the United States could become at least independent of wood imports and possibly a net exporter of wood. If domestic wood production is to be increased significantly, policies will be needed to: 1) improve the management of private timberlands; 2) resolve conflicts among the users of Federal public lands; and 3) investigate new uses and applications of wood materials. New technologies for the use of wood, which is a renewable resource, may also hold promise as substitutes for nonrenewable energy and materials resources in some applications.

This assessment has six objectives: 1) explore the properties, uses, and technologies for using wood as a material and its potential for substituting for nonrenewable materials; 2) assess the future demand and supply profiles of wood and identify future problems; 3) evaluate the capability of forest management technology to increase production; 4) analyze the forest management policies on public lands in reference to wood production and other forest uses; 5) assess the national technology for wood and forestry R&D; and 6) review public policies that affect forest production and the use of wood as a material and identify policy options for dealing with future problems.

The assessment is being conducted by the OTA Materials Program with consultation among other OTA program offices and other congressional agencies. Initial efforts will center on the identification of policy issues affecting the production and use of wood materials. A comprehensive review of wood technology and the potential for the future development of wood products will be undertaken. An assessment of the current state of forestry technology and the breadth of its field application will be conducted.

Ample use will be made of the planning documents and assessments directed by the Forest and Rangeland Renewable Resources Planning Act (RPA) and the National Forest Management Act of 1976. Finally, options for congressional consideration will be formulated for dealing with the identified problems and issues by bringing together the potential technological solutions with the public policy perspectives of timber production.

The assessment will cover a period of 18 months; from October 1981 through March 1983. Two interim Technical Memorandums are planned: 1) Technologies for Improved and Expanded Wood Utilization, and 2) Technologies for Improved Forest Management.

Delivery date: March 1983. Call 226-2269 for further information.

Requester: Senate Committee on Appropriations

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Impact of Technology on Competitiveness of U.S. Electronics Industry

There is a growing concern that key U.S. industries are declining in their international competitive positions. The electronics industry is particularly significant because it occupies a strategic position as a technological driving force for other industries that use products like semiconductors and computers. The OTA assessment will look at three sectors of this industry: consumer electronics (where the United States has suffered heavily from Japanese competition); semiconductors (where a strong U.S. position is under challenge); and computers (where the United States still appears to lead the world).

The assessment will focus on those major contributors to the competitiveness of the electronics industry that could most readily be affected by U.S. Government policy. In each case, a comparison will be made between the United States, Japan, and (to a lesser extent) Western Europe. These major factors are: 1) commercialization of research, development, and design; 2) manufacturing techniques and resources; 3) finance, including both private and public sources of funds; 4) human resources, both quantity and quality; and 5) governmental industrial policies.

Delivery date: Spring 1982. Call 226-2012 for further information.

Requesters: Senate Committee on Commerce, Science, and Transportation; Joint Economic Committee.

Strategic Command, Control, Communications, and Intelligence (C^3I)

U.S strategic nuclear forces are intended to deter hostile Soviet actions, and to do so in a way that contributes to international stability. Their ability to meet these objectives depends not only on the character and capabilities of the weapons systems themselves, but also on the character and capability of the supporting C^3I systems. Specifically, both deterrence and stability may depend on: 1) the reliability with which a Soviet attack can be detected; 2) the timeliness and quality of the information about such an attack that can be assembled; 3) the speed and reliability with which this information can be communicated to the National Command Authorities; and 4) the immunity to disruption of communications between the National Command Authorities and the strategic forces.

The technical difficulty of making strategic weapons themselves survivable was a major focus of OTA's study of "MX Missile Basing." The problems of assuring the reliability and survivability of the systems that control these weapons are at least as difficult.

The purpose of the study is to assess the technical capabilities and vulnerabilities of present U.S. strategic C³I systems. The study will identify needs and opportunities for improvement in the present systems, with special emphasis on additions to the system that could usefully be made in the near term with available technology. Promising avenues of research for future improvements will also be identified.

In order to carry out a meaningful study in the short time available, the study will be limited to: 1) central strategic forces, excluding European-based nuclear forces or general purpose forces; 2) the period of several hours after launch of the first enemy missile; and 3) situations in which the President is located at the White House, Camp David, or another prepared location at the time the attack begins.

Delivery date: Summer 1982 (Classified). Call 226-2020 for further information.

Requesters: Chairman, Technology Assessment Board; Senate Committee on Appropriations.

HEALTH AND LIFE SCIENCES

Water-Related Technologies for Sustaining Agriculture in U.S. Arid and Semiarid Lands

Freshwater is a controlling factor of U.S. agricultural productivity. In recent years, the availability of high-quality freshwater for agriculture, especially in the arid and semiarid United States, has become a major concern. In particular, competition for available water supplies, overdraft of underground aquifers, and deteriorating water quality have contributed to severe water supply problems for arid and semiarid U.S. agricultural lands (those receiving about 20 inches or less of rainfall annually).

The principal farming systems in arid and semiarid U.S. lands are irrigation agriculture, dryland farming, and ranching. Irrigation agriculture is one of the most seriously affected by reduced water supplies. This farming system accounts for over 80 percent of all consumed water withdrawn from streams and underground aquifers. About 90 percent of U.S. irrigated land is in the 17 Western States where water is in short supply. In California, Arizona, New Mexico, Nevada, Utah, Wyoming, and Idaho, for example, over 80 percent of the crops are produced with irrigation. Agricultural water supplies suffer from declining water tables as well as agriculture's inability to compete on the open market for the water that is available. Energy costs become a particular critical factor as water must be transported from greater distances or lifted from deeper aquifers. In addition, many conventional agricultural systems use available water inefficiently. The seriousness of the problem necessitates an assessment of present and emerging water-related technologies and their potential for sustaining arid and semiarid agriculture in the United States.

This assessment will focus on the opportunities of present and emerging technologies to provide long-term sustainable agricultural productivity by increasing efficiency of water use and reducing agricultural water demands in arid and semiarid U.S. lands. The ability of such technologies to improve water quality of agricultural runoff and the associated socioeconomic impacts also will be examined.

Technologies considered will include those that require modification of existing systems to maintain the present style of agriculture and those that involve fundamental changes through the adoption of low water-demand biological technologies and systems. The assessment will include a critical review of data on the magnitude of the arid/semiarid water problem, potentials for alternative supplies, and possible legal and institutional mechanisms supportive of the adoption of sound agricultural water-related technologies.

Delivery date: Spring 1983

Requester: House Committee on Agriculture

Technologies for Sustaining Tropical Forest Resources

Each year 1 to 2 percent of the world's remaining tropical forests are converted to other land uses or to wasteland. Where cleared land is developed for sustained agriculture, deforestation can be beneficial. But most land now being cleared cannot sustain farming or grazing with available technologies, so it is abandoned after a few years. Often the forests do not regrow because of highly weathered soils and harsh climates. Thus, highly productive but underused forest resources are giving way to grasslands and deserts of low productivity.

Deforestation has economic and environmental consequences that jeopardize U.S. imports of agricultural germ plasm, pharmaceuticals, chemical feedstocks, foods, drugs, animals for medical research, tropical hardwoods, and veneer and wood products. Also in jeopardy are U.S.-funded development projects in tropical countries, U.S. migratory wildlife species, and stability of global climates. Tropical deforestation places pressure on world oil supplies and is an important causal factor in the increasing number of refugees seeking U.S. entry.

The U.S. Agency for International Development (AID), the United Nations (U.N.) agencies, and the World Bank have increased funding for forestry severalfold in the past 5 years. American corporations and nonprofit institutions also have been increasingly involved in the search for solutions to tropical deforestation problems. Most importantly, many tropical nations' governments recognize that deforestation constrains their economies and their development options; they are now making institutional changes to slow deforestation and to accelerate reforestation.

The United States is recognized for its leadership in bringing the deforestation problems to world attention and for the technical versatility it has to address the problem. Sustaining tropical forest resources can be helped or hindered by applications of certain technologies. OTA will assess: 1) dimensions of the tropical deforestation problem; 2) impacts of technologies, both conventional and new, that the United States may apply to enhance use and management of forest resources; 3) the role that U.S.-funded agencies, such as AID, Peace Corps, the U.N., and the World Bank, play in developing improved technologies; 4) improved mechanisms for transferring such technologies to tropical nations and to tropical regions of the United States; and 5) the special strengths of U.S. institutions in relevant science and technology.

Delivery date: Spring 1983. Call 226-2192 for further information.

Requester: House Foreign Affairs Committee, Senate Committee on Energy and Natural Resources

Evaluation of Veterans Administration Agent Orange Protocol

The epidemiologic study by the Veterans Administration of the long-term health effects resulting from exposure to agent orange was mandated in the Veterans Health Programs Extension and Improvements Act of 1979 (Public Law 96-151). The same law requires OTA to review the study design. An advisory panel was assembled to carry out the review and the panel's first report was made in September 1981.

Delivery date: Intermittent. Call 226-2010 for further information.

Requester: Mandated by Public Law 96-151.

Strategies for Medical Technology Assessment

Technology assessment is gaining increasing acceptance as a means of rationalizing health care. This trend has been stimulated by the rapidly rising costs of health care and technology's contribution to those costs. Since assessments can be expensive and time-consuming and can result in delaying the diffusion of beneficial technologies, and since not all technological developments can be systematically assessed, it is critical to select: 1) the right technologies to be assessed, 2) the optimum stage of technological development, and 3) the appropriate assessment methods. It is also important for the information gained from assessments to be disseminated in a timely and efficient manner. Currently, there is no coherent Federal policy regarding the selection process, and there are major problems with information dissemination. These issues are critical because many Federal agencies, as well as private organizations and individuals, depend on information from assessments to make decisions.

This study examines the appropriateness and validity of existing assessment methods, such as controlled clinical trials, epidemiological studies, consensus exercises, and computer models, with the intent of identifying alternative strategies for assessment. In addition, the MEDLARS information and retrieval system of the National Library of Medicine is evaluated with respect to the appropriateness of indexing, storage, and retrieval of useful information. The uses of that information by both governmental and private sectors are then examined in relation to the safe, efficacious, and efficient use of medical technologies.

Delivery date: Early 1982. Call 226-2070 for further information.

Requester: House Committee on Energy and Commerce, Senate Committee on Labor and Human Resources

Medical Technology and the Handicapped

Approximately 45 million Americans—including 10 million children—have significant mental or physical handicaps. Technologies for aiding handicapped people are numerous, varied, and often complex and expensive. Such technologies are designed to alleviate, eliminate, or prevent the effects of handicapping conditions. They can be used to provide mobility and independence, restore or improve functional abilities, and help enable handicapped individuals to lead more productive and fulfilling lives.

The Federal Government's involvement in this area is extensive. A multitude of programs and agencies develop, evaluate, provide, pay for, and deliver technologies. Other actions—such as civil rights and education opportunity laws—provide conditions and incentives for further development of and investment in technologies for the handicapped.

Yet there are serious questions about whether technologies for the handicapped are being developed and used in as effective and efficient a manner as possible. Inadequate information exists regarding the overall process of technological development and use. Individual aspects of the technological process also remain troublesome. For example, what is the appropriate role for sophisticated technologies as opposed to (or in concert with) the soft areas such as human service delivery systems that ultimately may determine the effectiveness of technologies? What methods exist for assessing the costs and benefits to society or to handicapped individuals of investment in or use of various technologies? What is the state of knowledge in regard to such costs and benefits? What effect will advances in medical technology have on the number and types of handicaps?

This assessment will provide information on general issues, such as the state of the art of evaluating efficacy, safety, and costs. In addition it will address definitional problems and their implications. Most critically, it will examine several theme issues in depth. For example, what are the causes and the effects of today's emphasis on sophisticated technology?

Delivery date: Early 1982. Call 226-2070 for further information.

Requester: Senate Committee on Labor and Human Resources

Health and Safety Control Technologies in the Workplace

One hundred million Americans work. Each year there are some 2.3 million disabling injuries and 13,200 accidental deaths in the workplace, and perhaps 100,000 people die from job-related diseases. Efforts to reduce this

toll involve employers, labor organizations, nonprofit institutions, insurance companies, and Government agencies. To a major extent these efforts are directed at developing and applying control technologies—engineering controls, worker education programs, and personal protection devices.

New industrial plant construction and modernization of existing plants is expected to result from interest in increased productivity and reduced energy consumption. Such construction may offer opportunities for installing new technologies to reduce workplace health and safety hazards.

This assessment would develop information about research and development, diffusion, application, and evaluation of workplace control technologies. Engineering controls, worker education programs, personal devices, and interrelationships between them will be described and their role in worker protection evaluated.

One product of the assessment would be a series of options. These are expected to address:

- improving data about workplace accidents and illnesses,
- aiding development of appropriate technologies, their diffusion, application, and evaluation, and
- making control technologies available to small firms at a price they can afford.

Delivery date: Early 1985. Call 226-2190 for further information.

Requester: House Committee on Energy and Commerce.

Comparative Assessment of the Commercial Development of Biotechnology

"Biotechnology" refers to the use of biological techniques such as recombinant DNA technology, cell fusion, fermentation, and enzyme technology to produce chemicals, pharmaceuticals, or other substances to act on the environment to increase the quality of life (as in pollution control), or to improve the characteristics of economically important plants and animals. Advantages of biological production over the alternative methods of chemical production or extraction of substances from living tissues include reduced dependence on petroleum substrates or on large quantities of sometimes scarce plant, animal, or human tissues. Estimates or yearly potential markets for substances that could be produced from applications of recombinant DNA technology in just the chemical and pharmaceutical industries are $15 billion and more in the next 20 years.

The potential of biotechnology has stimulated a great deal of corporate activity in the United States in the last 2 years. Many new small firms have been formed and large corporations are developing capability in biotechnol-

ogy. Foreign activity in the field is intense, especially in Japan, West Germany, France, and the U.S.S.R.

This assessment will evaluate whether biotechnology and associated research and development are developing in the United States in such a way that this Nation is likely to be in a competitive position with other nations in the years ahead. The keys to competitive development of the biotechnology industry in the United States are basic research and the transfer of basic research into commercial application. One major influence on development of the industry in the United States is Government policies on funding of research, patents, health and safety regulations, antitrust laws, and taxation. Equally important and significantly influenced by Government policy are industrial/academic relationships and their influence on funding, research, manpower training, and information flow. New developments in the technology and in support technologies are important to the growth of the industry and will also be examined as part of this assessment. Analysis along the same dimensions as those above will be conducted for selected other countries in order to estimate the probable U.S. position in the biotechnology industry in the next 10 years.

It is also important to consider areas of application in the public interest. Attractive commercial applications may so engage industry that some areas, of great public benefit but higher commercial risk, could languish. The possible Government role in such areas will be investigated.

Delivery date: Interim Report, spring 1982. Full Report, summer 1983. Call 226-2090 for further information.

Requesters: House Committee on Science and Technology, Senate Committee on Commerce, Science, and Transportation.

Genetic Screening and Cytogenetic Surveillance in the Workplace

One of the most difficult problems in regulatory policymaking is determining what is a safe level of exposure to chemicals in the workplace. For any particular chemical, the scientific evidence on risk is often conflicting, and the cost of each incremental lowering of exposure levels becomes increasingly expensive. Further, because of the natural variability of humans, what may be safe for one person, or even the vast majority of people, may be hazardous to another. Accordingly, some occupational health specialists have advocated both genetic screening and cytogenetic surveillance of workers as a means of identifying high-risk individuals and environments where the entire work force may be at risk. The use of these techniques is controversial because the ability to actually identify high-risk workers is a matter of scientific dispute and the identification of such workers, if possible, could place their interests in opposition to those of the company.

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This assessment will examine the following questions: What is the technological state of the art? Do the claimed associations in fact exist between certain recessive genes or chromosomal abnormalities and increased risk of harm from certain chemicals? If these associations exist, do genetic screening and cytogenetic surveillance offer a cost-effective way to enhance worker health and safety, given the economic and technical fact of life that workers will face some exposure to chemicals? What are the alternatives, regulatory or otherwise? What responsibilities might companies have toward high-risk workers? How might these tests be done in order to protect the interests of all parties?

Four specific conditions for which screening tests are available will be examined in detail. They are G-6-PD deficiency, methemoglobin reductase deficiency, alpha-1—antitrypsin deficiency, and aryl hydrocarbon hydroxylase inducibility.

Delivery date: Summer 1982. Call 226-2080 for further information.

Requester: House Committee on Science and Technology

SCIENCE, INFORMATION, AND NATURAL RESOURCES

Societal Impact on National Information Systems

The National Information Systems project includes three information system case studies and an overview study (see Recent Publications, p. 29). The overview study examined the use of computer technology in national information systems, computer-related public policy issues that Congress is likely to face over the next few years, and key trends in the underlying technology and industry structure. The case study on computerized criminal history (CCH) records assesses the major issues and impacts associated with the principal alternatives for a national CCH system. The case study on electronic message systems (EMS) examines the impacts of EMS on the mailstream and on a possible U.S. Postal Service role in electronic mail. The case study on electronic funds transfer (EFT) analyzes the possible impacts of EFT on privacy, security, and equity.

Delivery date: Overview study published October 1981. (Call OTA Publishing Office, 224-8996, for availability.) EFT, EMS, and CCH case studies, early 1982. Call 226-2240 for further information.

Requesters: Senate Committee on the Judiciary; House committees—Judiciary, Post Office and Civil Service.

Societal Impact of Telecommunications Technology

This study reviews the telecommunication technology base and industry structure and identifies major participants in the domestic common carrier telecommunication sector, their roles and interactions. Several option alternatives are being developed regarding legislative approaches to respond to telecommunication issues. The implications of these alternative policy options are examined on the basis of a common set of key issues. Common issues being examined include aspects of rates, economics, and accounting; implications of regulation; competition and industry oversight; industry and market structures; role of the Bell System; the use of resources and impacts on R&D; and implications for users.

Delivery date: Summer 1982. Call 226-2240 for further information.

Requester: Senate Committee on Commerce, Science, and Transportation.

The Patent System and New Technological Enterprises

The climate for generating new technologically based enterprises in the United States has worsened during the past decade. Economists differ in their appraisals of the exact contribution such firms make to innovation, employment, and economic progress, however, it is possible that the contribution level is high and that technologically based enterprises are essential to the growth and revitalization of our society. Fledgling entrepreneurs and independent innovators are frequently dependent on, and influenced by, the patent system to a much greater degree than are large, established firms. In almost all aspects of the patent system—e.g., prosecution, interferences, licensing, litigation—small firms and individual inventors face far more difficult obstacles and economic choices than do the large firms. The importance of new technologically based firms to the future economic vitality of the United States underscores the need to assess the impact of the patent system on the generation and stimulation of such enterprises.

Delivery date: Spring 1982. Call 226-2249 for further information.

Requesters: House Committee on the Judiciary, Senate Committee on the Judiciary

Information Technology and Education

Over the last decade, the educational system has been increasingly pressed to meet a variety of new needs on a constant or even shrinking budget. The Federal and State governments now require that schools provide equal educational opportunities to groups traditionally outside the mainstream, such as the handicapped. Changing needs for job skills and changing demographic conditions also present new demands for education and training beyond the ages traditionally considered as the educational years. Information technology potentially provides opportunities for education systems to improve productivity and quality of instruction, and to offer more flexibility both in content, and in the time and place of offering. Previous attempts to enlist technology in education have had mixed outcomes, but the markedly lower cost and increased capability of new and projected computer technology, coupled with advances in telecommunication services, imply the need for a new look at educational use of technologies. The study will identify and project relevant technology and R&D activity, and the providers and users of curricula, and educational technology, and assess the likely impacts of selected alternative policies on the use of information technology.

Delivery date: Spring 1982. Call 226-2249 for further information.

Requester: House Committee on Education and Labor

High-Level Radioactive Waste Management and Disposal

More than three decades into the nuclear age, this country still has no permanent disposal facilities for commercial high-level radioactive waste. This assessment focuses on technologies for disposal of commercial high-level waste (spent fuel or solidified waste from reprocessing). A clear understanding of the problem of managing radioactive waste from its generation to final disposal requires comprehensive analysis of the interactive relationships among possible storage and disposal technologies; transportation systems; regulatory considerations; and Federal, State, and local jurisdictional prerogatives. The OTA study is using a systems analysis technique to evaluate a range of strategies for developing and deploying a commercial high-level radioactive waste disposal system. Other waste forms are considered to the extent needed to determine how their management and disposal will affect commercial high-level waste disposal plans and to provide a basis for analysis for the impacts of, and management problems presented by, a full-scale waste disposal system.

Delivery Date: Early 1982. Call 226-2132 for further information.

Requester: House Committee on Merchant Marine and Fisheries. Supported by: House committees: Science and Technology; and Foreign Affairs; and the Senate Committee on Energy and Natural Resources.

Impacts of Atmospheric Alterations

Many present-day human activities—particularly the burning of fossil-fuels are altering the Earth's atmosphere in potentially harmful ways. The precise nature and extent of such activities are unclear. However, the potential consequences are severe enough to merit careful congressional consideration of domestic and international Federal policies.

Some of the consequences, such as acid rain, are occurring today. Others, such as global climate changes due to increasing carbon dioxide concentration, may appear within the next century. Increasing sulfur and nitrogen oxides and their transformation products (acid rain and oxidants) may damage thousands of lakes, decrease crop and forest productivity, deplete soil nutrients, damage buildings and monuments, and have adverse effects on human health.

The assessment will characterize the potential benefits of acting now to abate long-range transport air pollution and the potential costs of action that may be premature. The study will: 1) identify the resources potentially at risk, as well as the societal concerns about the loss of these resources; and 2) identify broad pollution control strategies, and discuss their costs, potential effectiveness, and societal effects. OTA will develop a range of plausible, re-

gionally oriented impact scenarios which describe the potential environmental and social consequences of transported pollutants, and actions that might be taken to control them. These scenarios will not attempt to "forecast" the future, but instead, present a range of plausible consequences of these changes, in terms responsive to near-term congressional decisions.

Delivery dates: Staff draft, early 1982; Long Range Transport Air Pollutants, spring 1982. Call 226-2131 for further information.

Requesters: House Committee on Energy and Commerce; Senate Committee on Environment and Public Works

Assessment of Approaches to Wetlands Use

Both the development and the preservation of wetlands—swamp, marshes, bogs, and other areas that are periodically saturated with water—offer benefits to individual users of wetlands as well as to society as a whole. For example, when drained or filled, some wetlands may be converted into highly productive farmland or choice residential or commercial property. Valuable oil, gas, and timber resources may also be extracted from some wetland areas. Many other technological activities, such as the construction of dams, levees, breakwaters and jetties, and bridges and highways, often take place in wetlands. Similarly, undeveloped wetlands may provide flood control, fish and wildlife habitat, erosion protection, pollution control, and ground water recharge.

In the past, the values of undeveloped wetlands have largely been ignored or seen as less than those of developed or technologically modified wetlands. As a result, approximately 30 percent of the Nation's original wetlands have been modified in some way by various technological activities. During the last decade, the importance of the natural functions of wetlands has received increasing recognition. In response to concerns about wetlands, many Federal and State laws now influence the development and regulate the use of wetlands through measures such as acquisition, economic incentives, and permitting.

Proposals to develop wetlands have frequently led to controversy. To provide a framework for future debates on this issue, OTA will evaluate:

- the effects of technological activities on wetlands,
- technological and nontechnological options for mitigating undesired impacts,
- the functional values of different types of wetlands,
- problems associated with weighing the benefits of technological activities in wetland areas against the functional values of the wetlands that may be lost, and
- various approaches to wetlands use.

Delivery date: Early 1983. Call 226-2130 for further information.

Requester: Senate Committee on Environment and Public Works

Space Policy and Applications

The assessment explores the adequacy of the Nation's present and future civilian space technology base. It examines the possible reliance on that base for applications of space technology in the 1980-2000 time frame. The focus will be on current and anticipated uses and management of remote sensing, communications satellites, materials processing in space, and the utilization of the space transportation system. A range of program and policy options will be developed, together with their societal, institutional, and economic implications. International impacts and cooperation and the U.S. space technology-based competitive position will also be considered. The study has cross-cutting ties to the ongoing OTA assessments of solar power satellites, land productivity, and telecommunications, each with important space technology facets.

Delivery date: Early 1982. Call 226-2209 for further information.

Requester: Senate Committee on Commerce, Science and Transportation.

Impact of Advanced Air Transport Technology

This assessment examines the impact of introducing or not introducing advanced high-speed aircraft into our future commercial fleet and of other potential commercial aircraft developments. The assessment is being conducted in four parts: 1) advanced high-speed aircraft (completed), which examines the economic, energy, environmental, and societal impacts of introducing advanced subsonic and/or supersonic aircraft into the future commercial fleet; 2) air cargo systems, which studies the role, importance and impact of advanced aircraft technology on the air cargo systems; 3) program management and financing alternatives of advanced high-speed aircraft, which examines alternative means for financing and managing the development and production of an advanced supersonic or subsonic commercial air transport; and 4) air service to small communities, which is an inquiry into recent trends in air service to small communities and the possible influence of advances in commuter aircraft technologies on this service.

Delivery dates: Part 1, published April 1980; Part 2 (in press); Part 3, January 1982; Part 4 (in press). Call 226-2200 for further information.

Requester: House Committee on Science and Technology; Senate Committee on Commerce, Science and Transportation.

Airport and Air Traffic Control System

Increasing levels of air traffic have led to problems of congestion and delay at many of the Nation's large hub airports, and continued growth of commercial and general aviation will spread these problems to other airports in the future. The rate and incidence of growth will be affected by a number of factors—such as general economic conditions and the future evolution of

the deregulated airline industry—that are difficult if not impossible to foresee. There are, however, a number of steps that might be taken to alleviate these problems by increasing the effective capacity of the airport and air traffic control (ATC) systems. Potential ATC system components include enroute automation, collision avoidance, data link, and microwave landing system. The Federal Aviation Administration (FAA) currently plans to spend $2.4 billion for enroute computer modernization alone over the next decade, and users will have to spend billions more for equipment to operate in this new environment. Airport traffic-management alternatives include a number of proposals for increasing the efficiency with which airport facilities are used, such as reliever airports, peak-hour landing fees, stub runways, and automated terminal area metering. This assessment examines the likely future evolution of domestic aviation and examines both the FAA's proposals and other alternatives for meeting the increasing demand for airport and ATC services through the year 2000.

Delivery date: Early 1982. Call 226-2200 for further information.

Requester: House Committee on Appropriations; Senate Committee on Commerce, Science, and Transportation

PUBLICATIONS IN PRESS

The following list of assessment reports were in various stages of production at press time for this booklet.

The report availability date listed is OTA's anticipated production schedule for public release and is subject to priority changes to meet congressional needs. Please call OTA's Publishing Office on 224-8996 for cost and ordering information.

Energy Efficiency of Buildings in Cities

This assessment focuses on the interaction of technology and policy for new and existing buildings in U.S. cities for the next two decades. The massive current stock of buildings contains a high proportion of structures, both residential and commercial, constructed in a period of low energy cost, when no attention was paid to the continuing cost of energy use over time. Improving the energy efficiency of these structures is important from the point of view of energy policy, city viability, and the interests of individual owners and tenants.

This OTA study analyzes retrofit technologies, both to conserve energy and to employ renewable energy that can improve the energy efficiency of structures. Capital costs, energy savings, and factors such as reliability and maintenance are identified. A second principal portion of the study is an exploration of the type of policy most likely to actually produce an investment in the efficiency of building energy by various types of building owners. Regional factors affecting city opportunities constraints, choices of action open to Federal, State, and city governments, and the related impacts of various policy choices are explored.

Report availability: January 1982. Call 224-8996 for further information.

Requested by: House committees: Banking, Finance, and Urban Affairs; Energy and Commerce.

Impacts of Technology on Productivity of the Croplands and Rangelands of the United States

Were it not for technological advances, world agriculture would never have been able to keep pace with world population growth. Historically, U.S. technology has had a pronounced positive impact on increasing the productivity of croplands and pastures. U.S. dependence on a continuing supply of renewable natural resources compels it to maintain the stability of the ecological systems from which the resources arise. Now, however, there is increasing documented evidence showing that human activities are strain-

ing parts of the biological and physical systems and that the land's productivity is in jeopardy.

This land productivity assessment examines the effect of presently used technologies on the capacity of the cropland and rangeland resource base to sustain high levels of production, and on emerging technologies that might be used to offset adverse effects of some of the established technologies. The assessment includes evaluations of: 1) the adequacy of available data on the effect of technologies on land productivity; and 2) new technologies that have potential for restoring, maintaining, or improving the productivity of the cropland and rangeland resource base. Selected case studies were developed to indicate how society is affected directly and indirectly where long-term productivity of agricultural ecosystems is being altered through innovative applications of technologies.

Report availability: February 1982. Call 224-8996 for further information.

Requested by: House Committee on Agriculture, Senate committees, Environment and Public Works; Appropriations.

World Population and Fertility Planning Technologies: The Next Twenty Years

World population has passed 4.4 billion and is expected to double in 70 years. The current growth rate in some nations corresponds to a doubling of population in less than 20 years. Growth of this magnitude has major implications for the global biosphere and for international economic and political stability. Because of the consequences of rapid population growth—such as increasing demands for food, energy, and jobs—most governments and international agencies have adopted policies and initiated programs in the last 20 years to modify birth rates.

OTA's study of global population examines how Government policies and programs view planned birth technologies, and how new international population assistance has changed world population growth in the last 20 years. It projects probable impacts of population growth from 1980 to 2000 on food, energy, jobs, income, and other aspects of quality of life; and it assesses present and prospective birth technologies and factors determining their future development and use. The assessment focuses on the Third World, where 92 percent of population growth in the next two decades will occur and where their governments seek to slow growth. It includes a research agenda relevant to their problems and ends with the policy alternatives open to the United States in dealing with world population issues. U.S. domestic population policies are not included in this assessment.

Report availability: January 1, 82. Call 224-8996 for further information.

Requested by: The OTA Director, with approval of the OTA Congressional Board.

Radio Frequency Use and Management Impacts From the World Administrative Radio Conference of 1979

More than 150 nation's representatives met in Geneva, Switzerland, for 11 weeks in late 1979 to review and adjust the global allocation of uses of the radio magnetic spectrum. This major world meeting changed frequency allocations, adopted new definitions, planned additional future world and regional conferences, and modified the internatioanl radio regulations of the International Telecommunication Union (ITU). This study reviews the U.S. preparations for and participation in that conference, identifies its major results and projects their impacts, and looks at the future role of ITU and the U.S. participation in ITU and such future conferences.

Report availability: January 1982. Call 224-8996 for further information.

Requested by: Senate Committee on Commerce, Science and Transportation.

Freshwater Resources Management, Planning and Policy: An Assessment of Models and Predictive Methods

The effective management and protection of our freshwater is of far-reaching importance to the future of the Nation. Serious problems currently confronting the United States include inadequate surface water supply, ground water depletion, pollution of both surface and ground water, hazardous drinking water, and erosion of the most productive soils into rivers and streams. As the Nation's water problems become more complex, the often conflicting advice presented to Congress by Federal agencies, advocacy groups, and expert witnesses is increasingly difficult to evaluate. Often this advice is based on the results of computer models and predictive methods of unknown quality or effectiveness. The information provided by these techniques becomes the basis for deciding such congressional water resource policy decisions as funding water supply structures, pollution control programs, and initiating the use of such new technologies as desalination. OTA's study of the tools that help supply this information clarifies which proposals are based on the best available analysis procedures and the assumptions and limitations of these tools. The assessment considers a wide range of models and predictive methods, advising Congress of the credibility of the techniques used to predict the work of water resource projects and regulations, and the societal and environmental effects of these decisions.

Report availability: January 1982. Call 224-8996 for further information.

Requested by: House Committee on Interior and Insular Affairs.

Global Models, World Futures, and Public Policy—A Critique

The purpose of this assessment is to examine global models as a tool for long-range strategic analysis and policy development. The findings and recommendations of five major modeling studies, including Global 2000, are compared and evaluated.

Report availability: [illegible]

Requested by: [illegible]

Technological Innovation and Health, Safety, and Environmental Regulations

This assessment examines the effects of health, safety, and environmental regulation on the rate of productivity growth and on technological innovation in several sectors of the economy. The study also examines alternative regulatory policies with regard to their likely effects on private sector innovation.

Report availability: [illegible]

Requested by: [illegible]

RECENT PUBLICATIONS

This section describes those reports published in reverse chronological order since the last printing of the Current Assessment Activities booklet, dated March 1981.

Those reports stating that free summaries are available can be obtained by calling 224-8996.

Full reports are provided free to Members and their staffs for congressional use, if available. Others interested in the full reports can purchase them from the U.S. Government Printing Office or through the National Technical Information Service. Refer to the current OTA Publications Listing (OTA-P-58) or call OTA's Publishing Office (224-8996) for ordering information.

An Assessment on the U.S. Food and Agricultural Research System

The success of U.S. food and agriculture industries has been based on an ever-increasing use of new technologies. However, the effectiveness of these technologies and/or their development seems to be decreasing at a time when the research problem base is expanding and the intensity of some problems is increasing.

This assessment examines the scientific base for establishing national, regional, and local research problems; identifies the role of Federal, State, and private research institutions in solving these problems; evaluates cooperative methods in identifying priority research areas; updates evaluations of the adequacy of present basic and applied research efforts; and evaluates public policy options for Congress.

Published: December 1981. Free summary available.

Requested by: Senate committees: Appropriations; Agriculture, Nutrition, and Forestry.

An Assessment on the Development and Production Potential of Federal Coal Leases

This Federal coal leasing assessment involved an independent analysis of all outstanding Federal coal leases that included 565 developed and undeveloped leases and 172 preference-right lease applications. The study focused on the 548 Federal coal leases in Colorado, Montana, New Mexico, North Dakota, Oklahoma, Utah, and Wyoming. The study analyzes all mining activities on Federal leases, assesses the present and potential value

(development potential of the outstanding leases, estimates revenues to the Federal Government, and examines the feasibility of using deep-mining technology in leased areas. The assessment addresses issues of interest to the Senate Committee on Energy and Natural Resources and the House Committee on the Interior concerning the resumption of large-scale coal leasing and the role of coal in the Nation's energy future.

Published: December 1981. Executive summary available. Technical Memorandum on "Patterns and Trends in Federal Coal Lease Ownership: 1950-80" published March 1981.

Requested by: Public Law 94-377.

Cost-Effectiveness Analysis of Influenza Vaccine

Influenza is an infectious disease that occurs in epidemics in the United States during some years. During the 7-year period from 1971-72 through 1977-78, influenza accounted for 127,000 excess deaths and $1 billion in treatment costs in the United States. The preferable method of controlling influenza is prevention through vaccination. Inactivated influenza vaccines have been marketed in the United States since the 1940's. However, each year only about 10 percent of the total population and 20 percent of those people at high risk of dying from influenza receive influenza vaccine.

The assessment is based on a cost effectiveness computer based model using data on influenza vaccinations administered from 1971-72 through 1977-78. The analysis compares prevention of influenza by annual vaccination to treatment of the disease if it occurs. Studies have shown the vaccine to be about 60-percent effective in preventing influenza. During the period studied, an influenza vaccination for a person 65 years or older both saved medical costs associated with epidemic influenza and improved the person's health.

The assessment presents options for congressional action regarding information dissemination, funding a public immunization program, and authorizing medicare to pay for influenza vaccination.

Published: December 1981.

Requested by: House Committee on Energy and Commerce.

Technology and Soviet Energy Availability

Despite the fact that the Soviet Union is the world's largest oil producer and gas exporter, controversy has arisen over the prospects for continued energy independence of the U.S.S.R. itself, or the Soviet bloc as a whole, during the present decade. The possibility of a Soviet energy crisis has provoked a debate among U.S. policymakers over whether it is in the best interest of the United States to assist in Soviet energy development. This study

attempts to place this policy debate on a firmer footing by addressing, not if the United States *should* provide such assistance, but *whether, how,* and *to what extent* it might do so.

The study investigated the following questions:

1. What opportunities and problems confront the U.S.S.R. in its oil, gas, coal, nuclear, and electric power industries, and what are plausible prospects for these industries in the present decade?
2. What energy equipment and technology are most needed by the U.S.S.R.; of this, how much has been or is likely to be purchased from the West; and to what extent is the United States the sole or preferred supplier of such items?
3. How much difference could the West as a whole and/or the United States alone make to Soviet energy availability by 1990; and what are the implications of either providing or withholding such assistance for both the entire Soviet bloc and for the West?

Published: November 1981. Free summary available.

Requested by: House Committee on Foreign Affairs; Senate Committee on Banking, Housing, and Urban Affairs.

Patent-Term Extension and the Pharmaceutical Industry

Proposals have been made to extend the patent terms for pharmaceuticals to provide additional incentives for conducting pharmaceutical research and development. Because drug developers usually obtain patents before their drugs have been approved by the Food and Drug Administration, the length of the approval process can directly affect the length of time during the patent term that a new pharmaceutical can be marketed. In the report, OTA examined the following major issues:

- the rate of pharmaceutical innovation;
- the factors affecting innovation in the pharmaceutical industry; and
- the implications of patent-term extension for pharmaceuticals on innovation, the cost of pharmaceuticals and society.

Also presented in the report are the policy effects of various mechanisms to effect patent-term extensions. The implications of patent-term extension for the medical devices industry, the pesticide industry, and the chemical industry are discussed in an appendix.

Published: August 1981.

Requested by: House Committee on the Judiciary.

Computer-Based National Information Systems: Technology and Public Policy Issues

The National Information Systems project includes three information system case studies and an overview study. This overview study examines the use of computer technology in national information systems, computer-related public policy issues that Congress is likely to face over the next few years, and key trends in the underlying technology and industry structure.

Published: September 1981. Free summary available.

Requested by: House committees: Judiciary; Post Office and Civil Service. Senate Committee on the Judiciary.

MX Missile Basing

The Soviet Union may be in the process of acquiring, through increases in the accuracy of its new generation of MIRVed missiles (SS17's, 18's, and 19's), the capability of destroying our land-based intercontinental ballistic missiles (ICBMs) in their silos. The Department of Defense expected this Soviet capability to become substantial during the early 1980's. In response, the administration had proposed to deploy a new missile, the MX, in a series of multiple protective structure (MPS) groupings in the southwestern desert. Proponents claimed that the missile location uncertainty thus introduced would protect these missiles from Soviet attack. Opponents objected to the system on many grounds, including costs, technical feasibility, environmental impact, and an escalation in the arms race.

OTA's objectives were to assess the technical feasibility, strategic utility, cost, impact on the region, and future consequences of various MPS basing modes, and of any alternative missile basing modes that merited serious attention.

Published: September 1981. Free summary available.

Requested by: Chairman and Vice Chairman of OTA's Congressional Board.

Solar Power Satellite Systems

This report is a limited but independent assessment of the potential advantages, shortcomings, and impacts of solar power satellite systems. Major topic areas, within which key uncertainties are addressed in a balanced treatment of both positive and negative impacts, include: 1) future markets and need for power from solar satellites, 2) cost and feasibility of alternative satellite systems, 3) environmental impacts, 4) social and institutional factors, and 5) competing energy technologies and approaches. Within these categories, particular attention is devoted to launch vehicle capability, material resource limitations, health effects of microwave radiation, implications of highly centralized electric generation systems, and the expanded role of

the Federal Government in energy production that may be required. Strengths, weaknesses, and uncertainties associated with the solar satellite concept contrasted with those of other long-term energy sources such as nuclear fusion.

Published: August 1981. Free summary available.

Requested by: House Committee on Science and Technology.

U.S. Industrial Competitiveness: A Comparison of Steel, Electronics, and Automobiles

OTA's study of technology and the steel industry was published in June 1980; a parallel study on the international competitiveness of the U.S. electronics industry is in process. This assessment extended OTA's efforts in the study of industrial competitiveness to a cross-industry comparison. The comparative project drew on OTA's work in steel and electronics, supplements this with a brief examination of the U.S. automobile industry, and discussed the implications of these three case studies for U.S. policies toward industry.

The three industry sectors differ with respect to a wide range of factors which influence competitiveness—e.g., export orientation; level, nature, and maturity of technology; frequency of innovation. These differences permit comparative analysis of the three industries, including the effects of governmental policies on their competitive strengths.

Published: June 1981. Free summary available.

Requested by: Senate Committee on Commerce, Science, and Transportation.

Technologies for Determining Cancer Risks From the Environment

Reducing exposure to carcinogenic agents in the environment depends on identifying the causative agents, assessing the agents' potency, locating sites of exposure, and deciding on appropriate interventions. In addition, regulations to reduce exposure must be politically, socially, and economically acceptable. In this assessment, OTA examined four major issues:

- estimates of the percent of cancer due to environmental exposure;
- technologies used to test for carcinogenicity;
- methods used for extrapolating data from animals to humans; and
- regulatory pathways for controlling carcinogens.

Also presented are options for improving information gathering, processing, and decisionmaking.

Published: June 1981. Free summary available.

Requested by: OTA Director, with approval of the OTA Congressional Board.

Technology and Oceanography: An Assessment of Federal Technologies for Oceanographic Research and Monitoring

Federal ocean research efforts amount to about $1 billion per year and involve the operation of ships, satellites, buoys, aircraft, submersibles, and other advanced technology. Our capabilities have increased in recent years, which has resulted in steady, repeatable data collection and survey work in several important areas. But such phenomena—in particular, weather and climate, marine pollution, undersea mineral exploration, and fisheries (especially krill). This assessment identified the technological and management systems that are most effective in researching those four areas. Describes options available for technology and management systems.

Published: Jan. 1981. [illegible]

Requested by: [illegible]

Nuclear Powerplant Standardization: Light Water Reactors

No new orders for nuclear plants are likely to be placed for the next several years, but new electric generating capacity will be needed in the coming years. One of the greatest obstacles nuclear plants must overcome if they are to contribute to this new capacity is a lack of public confidence in reactor safety. Furthermore, there is probably general agreement among both proponents and opponents of nuclear power that the present licensing process is not an efficient means of ensuring either safety or economically viable reactors. Standardization of light-water nuclear powerplants has been proposed to improve both safety and licensibility. The potential benefits of standardization are clear and some progress has been made, but several issues have to be addressed before the concept can be implemented. For instance, the time needed to prepare and improve standard designs, to have available, and the period for which they should be valid will all affect the feasibility and desirability of standardization.

This study examines many of the technical and institutional issues about nuclear powerplant standardization to determine its current status, whether it can enhance safety, and the major issues about the extent to which standardization is possible.

Published: April 1981.

Requested by: [illegible]

Impacts of Applied Genetics: Micro-Organisms, Plants, and Animals

"Applied genetics" refers to those technologies that can influence biological characteristics inherited by living organisms. Recent advances in knowledge are leading to greatly expanded capability to affect genetic characteristics and to use these techniques to improve the quality of life. Both industry and government in the United States and abroad are increasing their efforts to harness the gene for production of fuels, chemicals, and medicinal products. This assessment identified and analyzed the impacts of nonhuman applications of genetic technologies. Animal, plant, commercial, and industrial applications are described. The costs and benefits, legal considerations, and social and ethical concerns associated with genetic technologies are identified and, where applicable, compared to those associated with nongenetic approaches. The potential of genetics in developing biological approaches to ensuring a sustainable future through renewable resources was considered. The study presents policy options with regard to such topics as the patentability of life forms, Government-industry relations in developing genetic technologies, and germ plasm maintenance.

Published: April 1981. Free summary available.

Requested by: The OTA Director, with the approval of the OTA Congressional Board.

Nonnuclear Industrial Hazardous Waste—A Technical Memorandum

This technical memorandum addresses the following topics:

- basic issues surrounding a degree-of-hazard classification approach;
- the potential for incorporating a degree-of-hazard concept through classification in current regulations of the Resource Conservation and Recovery Act;
- various methods for applying a degree-of-hazard classification system; and
- some questions to be addressed in making the decision whether or not to select and incorporate a degree-of-hazard classification system at the Federal and State level.

Published: November 1981. Final Report due in summer 1982. Call 226-2200 for further information.

Requested by: House Committee on Energy and Commerce.

Coal Exports and Port Development—A Technical Memorandum

This technical memorandum addresses four major issues:

- estimating the potential U.S. coal export market;
- development of foreign trade policy;
- the Federal role in dredging harbors; and
- the outlook for alternative technologies.

This analysis indicates that sizable increases in future U.S. coal exports are achievable if the Federal Government and the private sector complement the efforts of each in encouraging these exports and if present trends are not drastically altered by developments in other exporting and importing countries. Without a coherent, positive policy, the United States could lose a substantial share of the future coal export market.

Published: April 1981

Requested by: OTA Congressional Board

Patterns and Trends in Federal Coal Lease Ownership, 1950-80—A Technical Memorandum

This memorandum traces the history of the 538 Federal coal leases in existence at the end of 1979. It focuses on the coal lessees themselves: who they are, what they do, how and when they acquired Federal coal leases, and what they have done with those leases. It identifies the participants in the Federal coal leasing program between 1950 and 1980, traces the ownership on a lease-by-lease basis, and discusses the business activities and organizational structures of the lessees.

It does not discuss anticipated production from Federal coal leases, nor does it discuss factors, including Federal policies, that could affect development of and production from Federal coal leases. These topics are covered in the final report.

Published: March 1981 (Final Report—"An Assessment of the Development and Production Potential of Federal Coal Leases" published December 1981)

Requested by: Committee on Energy and Natural Resources

SELECTED PUBLICATIONS OF INTEREST

ENERGY, MATERIALS, AND INTERNATIONAL SECURITY DIVISION

* **Energy From Biological Processes**—Evaluates the energy potential of plant and animal matter.

Conservation and Solar Energy Programs of the Department of Energy—Analyzes the progress and direction of five major conservation and solar energy programs of the U.S. Department of Energy.

Residential Energy Conservation—Examines the prospects of existing and new technologies for reducing energy consumption in homes.

The Direct Use of Coal: Prospects and Problems of Production and Combustion—Assesses the prospects as well as the environmental, health, safety, and other problems of mining and burning significantly more coal than at present.

Application of Solar Technology to Today's Energy Needs—Evaluates the economic, technical, and environmental impacts of solar energy systems located at the point of use.

* **A Technology Assessment of Coal Slurry Pipelines**—Compares the cost of transporting coal by slurry pipelines to rail for certain routes.

Enhanced Oil Recovery Potential in the United States—Assesses the potential for increasing domestic production of oil by applying developing technologies to known reservoirs.

Technology and Steel Industry Competitiveness—Assesses how and when new technology can improve the international competitiveness of the U.S. steel industry.

An Assessment of Oil Shale Technologies—Assesses the status and potential of technologies for the development of oil shale resources.

Technical Options for Conservation of Metals: Case Studies of Selected Metals and Products—Explores the kinds and amounts of waste that occur in our use of eight critical metals.

Materials and Energy From Municipal Waste: Resource Recovery and Recycling From Municipal Solid Waste and Beverage Container Deposit Legislation—Examines present and potential technologies for producing energy and recovering resources from municipal solid waste.

Management of Fuel and Nonfuel Minerals in Federal Land—Analyzes Federal laws and practices that govern the exploration, development, and production of fuel and nonfuel minerals in onshore Federal Lands.

Analysis of Laws Governing Access Across Federal Lands: Options for Access in Alaska—Analyzes laws, regulations, and policies affecting access across federally owned lands to minerals on non-Federal lands.

Technology and East-West Trade—Examines the economic, military, and political implications of technology transfer to the Communist world.

The Effects of Nuclear War—Examines the social, economic, political, and health effects of various levels of nuclear attacks on the United States and the Soviet Union.

Taggants in Explosives—Assesses the technical feasibility, safety ramifications, costs, and law enforcement utility of a proposal to require that commercial explosives be manufactured with "identification and detection taggants."

World Petroleum Availability: A Technical Memorandum—Examines prospects for world oil supplies and production during the next two decades.

Gasohol: A Technical Memorandum—Discusses the technology and economics of gasohol production.

Benefits of Increased Use of Continuous Casting by the U.S. Steel Industry: A Technical Memorandum—Describes the continuous casting process and the rate of its adoption by U.S. and foreign steel industries.

HEALTH AND LIFE SCIENCES DIVISION

* **Environmental Contaminants in Food**—Discusses the different types and sources of chemical and radioactive contaminants in food.

* **Pest Management Strategies in Crop Protection**—Reviews the array of tactics currently used to control agricultural pests.

Open Shelf-Life Dating of Food—Addresses the practicality, benefits, and costs of open shelf-life dating of food products.

Drugs in Livestock Feed—Analyzes the use of antibacterial and other drugs to promote growth and prevent disease in livestock.

Emerging Food Marketing Technologies: A Preliminary Analysis—Examines new and emerging technologies for marketing food.

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*Summary available

Nutrition Research Alternatives—Evaluates alternative strategies to redirect Federal research toward examining the relationship between nutrition and the changing health problems of Americans.

Organizing and Financing Basic Research To Increase Food Production—Evaluates alternative methods for organizing and funding basic research in the biological sciences.

The Implications of Cost-Effectiveness Analysis of Medical Technology—Analyzes the feasibility, implications, and usefulness of cost-effectiveness analysis and cost-benefit analysis in health care decisionmaking.

Forecasts of Physician Supply and Requirements—Analyzes the assumptions, methods, and conclusions of the technologies for forecasting both the need for and supply of physicians by specialty and geographical distribution.

A Review of Selected Federal Vaccine and Immunization Policies Based on Case Studies of Pneumococcal Vaccine—Analyzes Federal policies related to four areas of vaccine and immunization activities.

Selected Topics in Federal Health Statistics—Examines data systems used in Federal health programs and offers alternatives for their effective management.

Assessing the Efficacy and Safety of Medical Technologies—Evaluates the need for assessments of the efficacy and safety of medical technologies before they go into widespread use.

Policy Implications of the Computed Tomography (CT) Scanner—Analyzes issues such as efficacy, health planning, use, and financing arising from the widespread adoption of the CT scanner.

Policy Implications of Medical Information Systems—Examines the potential of computer-based medical information systems.

Cancer Testing Technology and Saccharin—Assesses the capacity of current testing methodology to predict the carcinogenic potential of chemicals consumed by humans.

Compensation for Vaccine-Related Injuries: A Technical Memorandum—Reviews the pros and cons of establishing a Federal vaccine injury compensation program.

SCIENCE, INFORMATION, AND NATURAL RESOURCES DIVISION

* **An Assessment of Technology for Local Development**—Assesses several prototype technologies, the local problems they may alleviate, and their feasibility and potential impacts.

A Preliminary Assessment of the National Crime Information Center and the Computerized Criminal History System—Identifies issues emanating from use of the FBI's National Crime Information Center and Computerized Criminal History system.

A Preliminary Analysis of the IRS Tax Administration System—Raises questions about the civil liberties, privacy, and due process of millions of Americans that could arise from a new computer system.

* **Impact of Advanced Air Transport Technology, Part 1: Advanced High-Speed Aircraft**—Assesses the economics, feasibility, and uncertainties of developing advanced subsonic and/or supersonic passenger aircraft.

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Coastal Effects of Offshore Energy Systems—Assesses social, economic, and environmental impacts of three proposed offshore energy systems.

Oil Transportation by Tankers: An Analysis of Marine Pollution and Safety Measures—Examines safety problems of oil tankers on the ecology and quality of the oceans and coastal areas.

Ocean Margin Drilling: A Technical Memorandum—Evaluates the newly proposed public-private cooperative research effort in marine geology.

Recent Developments in Ocean Thermal Energy: A Technical Memorandum—Reviews status of ocean thermal energy conversion (OTEC) developments occurring after OTA's 1978 report on OTEC.

*Summary available

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Excerpt From Technology Assessment Act of 1972
Public Law 92-484, 92d Congress, H.R. 10243
October 13, 1972

FINDINGS AND DECLARATION OF PURPOSE

SEC. 2. The Congress hereby finds and declares that

(a) As technology continues to change and expand rapidly, its applications are—

(1) large and growing in scale; and

(2) increasingly extensive, pervasive, and critical in their impact, beneficial and adverse, on the natural and social environment.

(b) Therefore, it is essential that, to the fullest extent possible, the consequences of technological applications be anticipated, understood, and considered in determination of public policy on existing and emerging national problems."

OTA-PC-105 (Revised January 1982)